

# The National Geographic Magazine

AN ILLUSTRATED MONTHLY

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THE WELLMAN POLAR EXPEDITION

By WALTER WELLMAN

The Wellman Polar Expedition of 1898-'99 had two purposes in view. One of these was to finish the exploration of Franz Josef Land, and the other was to make an approach, by means of what is known as "a dash," near or to the North Pole. Incidentally to both these efforts scientific work of the usual character was to be carried on by a competent corps of observers. The expedition was aided in a financial way by the National Geographic Society, by President Josiah of the American Museum of Natural History, by President McKinley, Secretary of State Hay, J. Pierpont Morgan, W. K. Vanderbilt, William C. Whitney, Richard Olney, and other well-known public men. The cost of the expedition was about \$27,000, of which sum \$12,000 was subscribed by the various contributors.

June 26, 1898, the expedition sailed from Tromsø, Norway, in the ice-steamer *Fritzyf*. Aboard were nine members of the expeditionary party—four Americans and five Norwegians. Prof. James H. Gore, of Washington, who had planned to accompany the expedition to Franz Josef Land for a summer's work in geodesy, was unable to go beyond Tromsø on account of the danger that the ship might not get back in time to enable him to meet imperative engagements. Calling at Archangel, Russia, the *Fritzyf* took aboard a pack of 83 Siberian dogs which had been brought from the Ob river by Alexander Trontheim, a trustworthy Russian, who has now supplied three Arctic expeditions with draught dogs purchased from the Ostiak tribes. In order to deliver his pack according to contract, Trontheim had to make

a 2,000-mile journey over the Ural mountains, across the plains and tundra, fording swollen rivers and wading deep swamps. Material for house-building was also taken on at Archangel, and the *Fridtjof* then steamed northward. The pack-ice was met at about the 77th parallel of latitude July 9, and three days later, the supply of coal running short, it was deemed prudent to run back to Norway for more fuel. July 20 the ship was again at the ice edge, and after a week of ramming through loose floes and searching for open leads found a clear waterway, in which such rapid progress was made that the ice-capped mountains of Franz Josef Land were visible from the crew's-nest July 27.

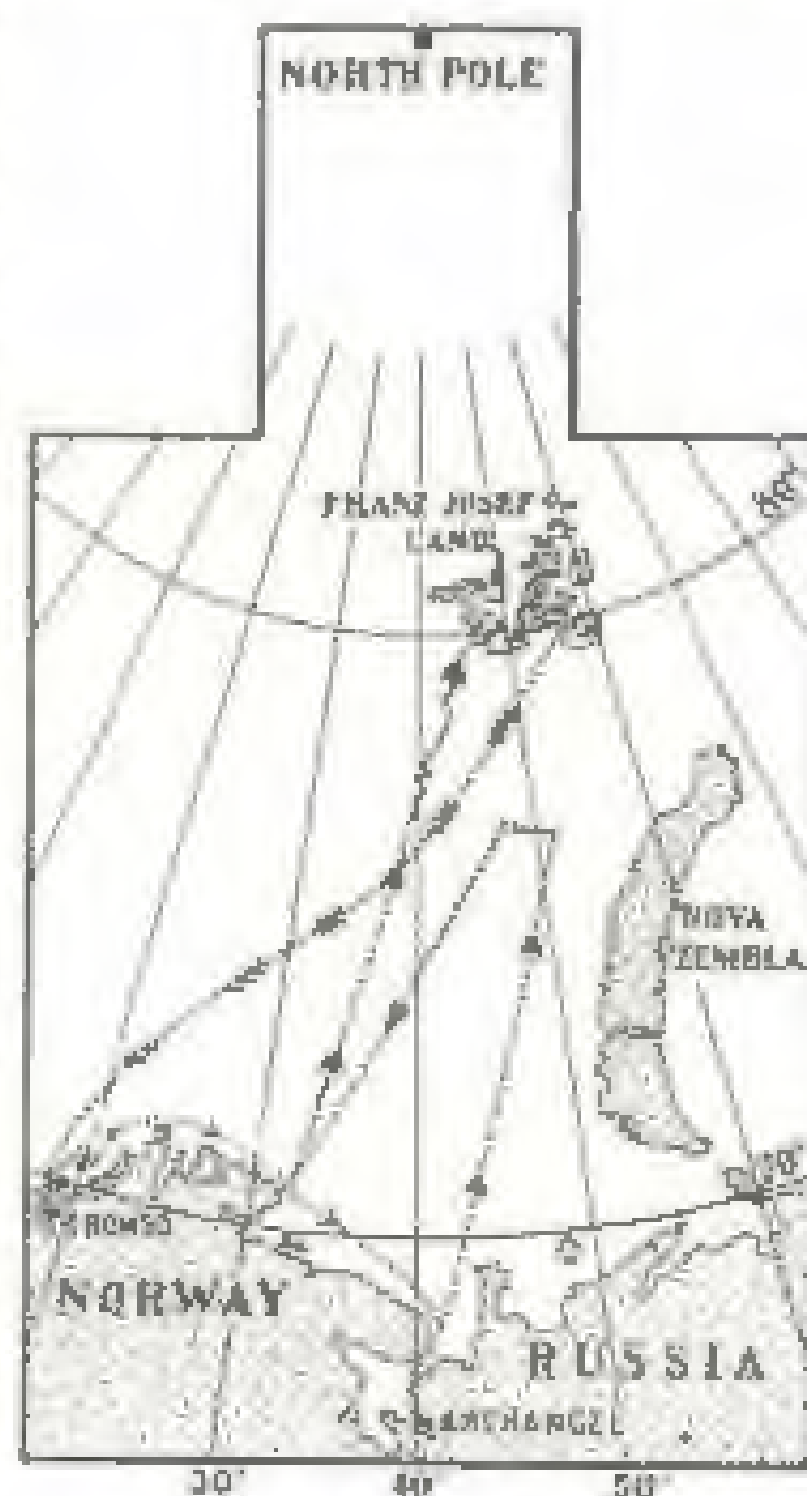
Next day the *Fridtjof* was at Cape Flora, which for three years had been the headquarters of the Jackson-Harmsworth (English) expedition, and where Nansen and Jackson had had their memorable meeting in June, 1896, a chance encounter which doubtless saved the lives of the Norwegian explorer and his comrade. It had been the first plan of our expedition to make Cape Flora our winter quarters, and we had secured from Mr Harmsworth the privilege of making such use as we wished of the house and stores there. It appearing that there was a possibility of pushing our winter quarters farther north and east, we took aboard one of the collapsible houses, which had been used at Cape Flora for storage purposes, and steamed away to the eastward.

At Cape Flora we had hoped to find Andr   and the members of his balloon expedition, which had left Danes island, Spitzbergen, a year before; but finding neither Andr   nor any tidings of him, we were forced to the sad conclusion, which time has since confirmed, that the brave Swede and his comrades lost their lives by a descent of their air-ship into the waters of the Barents sea, east of Spitzbergen and south of Franz Josef Land, probably within 10 or 15 days after their ascension.

After making an unsuccessful effort to push our ship north through the ice-clad British channel, which had been explored by Jackson and down which Nansen had come in his retreat from his winter hut, we moved eastward along the south coast as far as Cape Tegetthoff and Salm island. Off the south shore of this island we steamed in open water over the very spot where the Austro-Hungarian ship *Tegetthoff* had been abandoned, fast in the ice, a quarter of a century before. It may be remembered that for more than a year the *Tegetthoff* had been held in the ice, having become beset off the western shores of Nova Zembla, and that she had drifted helplessly to this spot, where her crew,

through this fortunate accident, were able to discover a hitherto unknown Arctic land. Vainly endeavoring to find water through which to force the *Fridhof* still farther north along the east coast (then unexplored), and finding nothing but ice in every direction, we were compelled to return to Cape Tegethoff, and there send our stores ashore for the purpose of establishing winter quarters. By August 3 this work was completed, and the ship sailed away for home, leaving us the only human inhabitants of Franz Josef Land, our nearest neighbors being Samoyedes and a few Russians in Nova Zembla, 300 miles to the south. Neither Franz Josef Land nor Spitzbergen is now inhabited by Eskimo or other northern tribes, and, so far as can be learned, never was occupied by any other men than Europeans there for the purposes of exploring and hunting or fishing. Spitzbergen has been known for 250 years, and is visited every summer by a considerable number of craft, but Franz Josef Land has until recently remained almost a *terra incognita*.

The cosmopolitanism of modern scientific exploration is nowhere better illustrated than in this region. Discovered by chance by Austro-Hungarians, it was next visited by Englishmen under the leadership of R. Leigh Smith. It was in 1882 that Mr Smith, on his second voyage to these coasts, lost his ship, the *Rön*, near Cape Flora, and was compelled to pass the long winter in an improvised hut built but a few rods from Mr Jackson's subsequent headquarters. The ruins of that hut, in which 25 men passed the winter in good health, living chiefly



WELLMAN'S ROUTE TO THE NORTH POLE, 1894

Copyright, 1894, by Walter Wellman



upon bear and walrus meat, still remain, mute witnesses to the fact that Dr Nansen and Lieutenant Johansen were not the first explorers to show that if worst comes to worst the adventurous man, caught out for the long night, may make himself reasonably comfortable with such materials as the country affords, while his rifle keeps him from starvation.

Next came the carefully prepared Jackson-Harmsworth expedition, which explored the western and central parts of the archipelago, but did not succeed in getting farther north than a little beyond the 81st parallel. Mr Jackson, whom I esteem as a painstaking and conscientious explorer, pronounced his judgment that Franz Josef Land was not a good gateway to the Pole, being a mass of small, detached islands, instead of a continental land mass. My own opinion is quite the contrary. It is true the region is one of comparatively small lands and many islands, and in summer the straits and fords are broken up and filled with drift-ice, which precludes, more or less, active expeditionary work; but at this season of the year not much can be done anywhere in the Arctic, and in the favorable season, to wit, the spring of the year, these fords and straits afford the best of roadways toward the far north.

The next visitor to these lands was Dr Nansen, and he came down from the north on his return from his memorable sledge journey from the *Fram*, reaching the northeast islands at the end of the summer, and finding it necessary to winter in an improvised hut. Next spring, without knowing where he was, and imagining himself to be nearer Spitzbergen than Franz Josef Land, he renewed his journey, only to meet, by a most rare and happy chance, with the Englishmen at Cape Flora.

After the Norwegians came the Americans, ourselves, with our Norwegian comrades, and as we were coming out this summer we met going in the young Duke of Abruzzi, the Italian prince. This young scion of royalty (he is a son of a former King of Spain, Amadeus) has at great expense outfitted his expedition, and is determined, as he says, to reach the Pole or lose his life in the effort. When we met the Duke his ship, the *Stella Polare*, was in the British channel, in latitude  $80^{\circ} 26'$ , and with good prospects of pushing 20 or 30 miles farther north before stopping for the winter. Subsequently a pigeon message is reported arriving in Russia with word from the Italian explorer that he is wintering about the 81st parallel of latitude, near the site of the Nansen hut. He has, therefore, an excellent chance for doing good work.



ROCKY POINT - CHALK POINT AREA  
Copyright, 1964, by Walter H. H. H.

in the way of a northerly advance next spring. He has 120 dogs, procured for him by Fromheim, and every device that ingenuity could suggest or money buy. The real test for him will come, as it comes to all who attempt the arduous road to the Pole, when he leaves his comfortable winter quarters or his ship and takes to the open field in a sledging trip during the extreme cold. Up to this time it is all comparatively easy, but sledging in February, March, and April tries men's endurance and courage to the utmost.

It is not too much to say that of all the men now in the Arctic regions the young Italian prince has the best chance to reach the Pole or to eclipse Dr. Nansen's record. In my opinion, neither Peary nor Sverdrup, both of whom are wintering on the west coast of Greenland, about latitude  $79^{\circ}$ , has much chance. Their base is too far south. True, Lieutenant Peary has supplies at General Greely's house at Fort Conger upon which he may draw during his sledge journey next spring, but he must travel 150 miles to reach that outpost, and then will be but a little nearer his goal than the Italian is at his base. Besides, Mr Peary was unfortunate enough last winter to suffer the loss of seven toes, and though he is known to be a resolute man, it is questioned by all men of Arctic experience if it be possible for him, thus handicapped, to endure the tortures of a severe sledging campaign. As for Captain Sverdrup, who has so far failed in his scheme to circumnavigate Greenland in the *Fram*, it is not known precisely what he is to attempt to do.

With Peary, Sverdrup, and Abruzzi the conditions are the same in one important respect as they were with us. The effort to make the North Pole must be by a dash, and nothing but a dash. The writer admits that he was the author of the phrase, "a dash for the Pole," but he cannot claim credit as the originator of the idea. As far back as 1827, Parry, the Englishman, attempted a dash for the Pole from the shores of northern Spitzbergen, and established one of the northerly records in that constant advance toward the Pole which restless man has persisted in making. Many other dashes have been made since that time.

Why must it be a dash? Why cannot one take his time to the task, making a gradual approach, year after year? These are questions often asked. The answer is very simple. If we had land extending to or near the Pole the old theory of a gradual advance from depot to depot would hold good. Reaching the Pole would in that case be simply a question of persistent effort,



of stretching out a base of supplies, of a long campaign, or of one organized on a sufficiently large scale to enable the flying column at the front to be well supported from the rear. But the polar explorer, like the mining engineer, the railway constructor, and the colonist, must take conditions as he finds them and adapt his methods to them. There are two main avenues of approach to the Pole—one by North Greenland and the other by Franz Josef Land. These are the two lands reaching nearest to the Pole from lower latitudes, but neither extends, so far as we now know, nearer than within 450 miles of that mathematical point upon which it is the ambition of man to plant his feet.

The aim of every pole-seeker is to get his base or his outpost established as far north as possible upon the land, and to make a dash beyond that point. Thus Mr Peary planned a depot of supplies at the extreme northerly limits of Greenland, but has not as yet been able to establish it. Abruzzi is wintering at  $81^{\circ}$ , and we made our headquarters a little north of  $80^{\circ}$ , and established an outpost about  $81^{\circ}$ . The explorer may use two or three years in establishing his outposts upon the most northerly land he can employ for this purpose, but when he once leaves the land and takes to the frozen surface of the polar sea his journey must be one of short duration—a dash—for these reasons:

1. It is only in the spring of the year that he can travel advantageously over the ice-sheet, and this is so because the winter is too dark, while in the summer the warmth of the sun makes the snow soft and "sticky," fills the pockets with sludge and water, and aids the winds and currents in breaking up the ice. The favorable, practically the only, season for travel over this drifting, shifting field of ice, is confined to March, April, and May, with what little of February one is resolute enough to use amid the darkness, and a part of June in which he may still do something before the snow becomes too soft. Thus the pole-seeker has at his command from 110 to 125 days, according to the swiftness of his start, in which to make his northerly journey and his return to the land.

2. Everything he and his dogs eat, as well as the fuel for melting ice into drinking and cooking water, must be carried from the land or the outmost depot, not only for the advance journey, but for the return. Nothing can be had on the way. There is a limit, of course, to the weight of load that may be carried, and if the sledge party started with supplies for a six months' campaign they would be so heavily burdened they could make no



A SEAL OR WALRUS KILLED FOR MEAT.

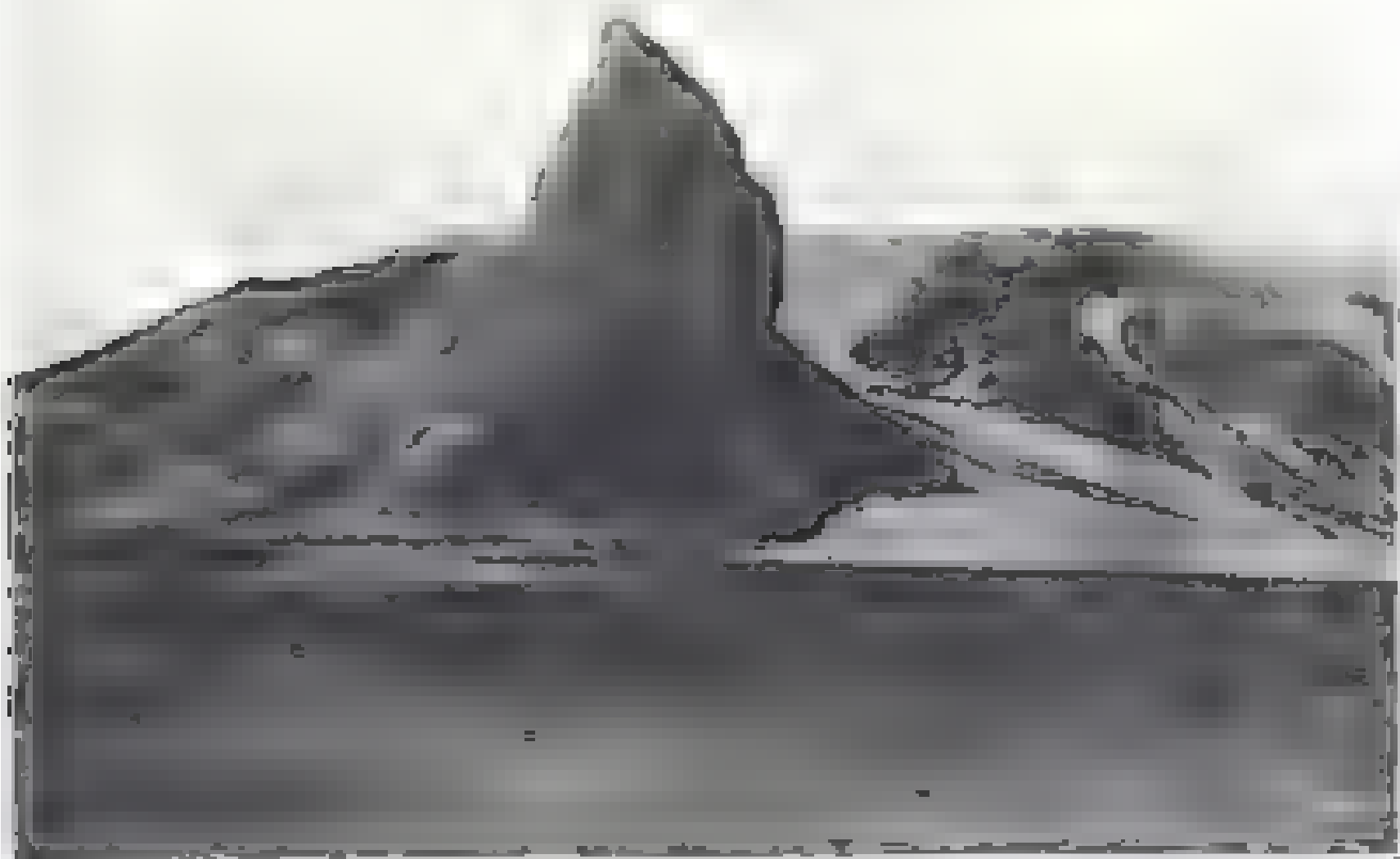
Copyright, 1906, by Henry Williams.

progress at all. At the minimum each man must have two pounds of food and each dog one pound per day, and the hauling power of a dog is limited to about 60 pounds and of a man to about 200 pounds. Besides, there is weight of sledges, instruments, bedding, weapons, etc., to be reckoned.

It is useless to establish depots upon the sea ice beyond the land, for the sufficient reason that they could never be found again, except by mere good luck. Even in winter the ice-sheet is never at rest. It is constantly drifting to and fro, with a general movement, as was shown by the voyage of the *Fram*, toward the west. If one left a depot upon the ice he could never be sure the ice had not opened there during his absence and destroyed it. On returning from their sledge journey, Nansen and Johansen made no effort to find the *Fram* again, though they were at no time more than 115 miles from the ship, and on their southward march, with a dreadful and doubtful prospect before them, they must have passed within 30 or 35 miles of her at farthest.

Limited in time and limited in weight, the explorer perceives

at the end of practice the sailing for lunch comes to take advantage of the favoring breeze. It is 1.18 to 1.25 over and makes the plans accordingly. The light breeze is on from the east or east by north at the average rate of twelve knots between the two extremes, leaving to find the happy mean and to apply to it the master's skill, and ingeniously keeping down weight and momentum of the power. Thus we see a vessel sailing by direction.



As we made the land from the *Drum* after a short sail within the ocean, we found the start and the best course to make to the Pine Bay, where we found the time to come. Peary proposes a dash from north over the Andree make his dash. However, it is necessary, by all means, to make a dash from near Hanson's winter hut on our own outfit.

We have to dash to and to get away from the ice to the open sea. In preparation

to reach or approach the Pole, and also to end the work of the expedition, which also formed a part of our plans, we established at Cape Heller near the 81st parallel an ice depot or depot of stores. This was done immediately after our arrival in Franz Josef Land. Within two days after the *Arcturion* sailed for the Norway a party set out with small boats and sledges for the north. Their object was to find a safe passage out as far north as possible. When they started the ice-sheet upon the bay in the straits was so thin apparently as to permit of conditions



REAR VIEW OF ICE DEPOT AT CAPE HELLER

100' 0" 100' 0" 100' 0"

often change with amazing rapidity in the Arctic, and so it was in this case. Within less than 48 hours the party found themselves surrounded by ice, and the ice-sheet began to break up of the ice and its rapid drifting out to sea under the influence of strong offshore winds. Nothing but desperate, even heroic, work enabled them to save their lives and the valuable equipment. Finally managing to reach the land they struggled northward for a month, sometimes upon the ice-sheet, more often upon the rough shore, crossing and crossing glaciers and now and then advancing some of their heavier weighty loads

point very close to water, and were of length comparable to stop for good or account of drift-ice in the channel and the rapid approach of winter.

At Cape Heller they collected a lot of rocks. A few pieces of driftwood served for the ridge pole. The hides of walrus, killed in the water pools of Asiana sound, near by, formed the roof. To this hut were accumulated about a ton of stores for the following spring: sledges, boats, and other articles needed on a long journey. Forty dogs were there also, and for their sustenance during the winter too. Fresh fish of fifteen varieties was cut in small squares and stored in a tin bath of snow blocks. To protect the hut from the winter storm of high winds of snow were built up, and these made the premises look as if built like an ill-fashioned cottage of that Mr. Hall with the rest of his party, named the place Fort McKinley. As soon as everything was made snug for the winter Mr. Hallwin, pursuant to his instructions, asked for volunteers to remain at the hut through the winter to guard the supplies and care for the dogs. All five of the Norwegian members of the party offered their services, and given was the dearest payment of the three who were not chosen. The two men assigned to the task were Paul Björnsen and Bertt Bentzen. Of the rest, both women, being alone, and warm, he said.

Together they and I then talked of the future. It would be to pass a winter in the Arctic in a hut of ill-wellstocked with food, and tobacco, and this was to be the realization of their dream. Their enthusiasm was not due to inexperience. Paul Björnsen was a veteran Arctic sailor and traveler, and had been with the Wellman Expedition of 1894 to the north of Spitzbergen. Bertt Bentzen was a member of Dr. Nansen's crew aboard the *Fram* on that famous drift-voyage through the polar seas. Both men were happy and well when their comrades left Laem and started for our headquarters at Cape Tegetthoff just at the beginning of winter. It is now evident that but a few miles to the westward of this hut is the spot where Nansen and Johansen passed the winter of 1895-'96 in a similar structure, built out of such materials as could be found upon the ground.

Meanwhile those of us who had remained at Cape Tegetthoff were busy preparing our own houses for the long winter. As first erected, the hut was a mere shell, two thicknesses of thin boards with an air-space between, and a roof of two layers of canvas. The house was ten-sided, one of the sections containing a door and two others little windows. With planks converg-









All three of my American comrades, unfortunately, were ill for short periods during the winter, and it is made it impossible for any of them to accompany me upon the sledge journey to the north, for which we were all well and busily preparing. But these ill might have saved themselves at home, and were in no way due to the climate or the surroundings. We had good beds, good food, including plenty of fresh bear meat, and American oatmeal, bacon, and flapjacks were not long then.

To the most of us the winter seemed short and not much of a test of patience. True, the absence of the sun for 127 days and nights was somewhat of a deprivation, leading us to the conclusion that if we were going to pass the remainder of our days in these regions sunworthy is the religion which would most strongly appeal to us, but we had work to do, hours to keep, scientific observations to carry on, books to read, exercises in the open air to take when the winds did not blow too severely and the night was not too long. At least every day we were out for a walk or a run upon snowshoes, and glorious it was to get about in the crisp air and the bright moonlight. But for the moon there is no northern world would be the very depth of gloom during the winter; but when the skies were clear and the moon was full, the Arctic night was almost as bright as a winter day in temperate zones, and some of our best photographs were taken under these conditions.

Water was not neglected by any member of our party, even in the coldest weather. A tub of water was taken into the stores, and one man at a time and I sought the temperature there was usually from 5 to 10 below zero, we stripped and bathed in tolerable comfort and without taking cold. In fact, such a thing as a cold the winter has never suffered from in the Arctic regions, although we have bathed in the open sea, diving from icebergs, and refreshed himself by a naked plunge in a natural ice formed of ice floor and warm. Wood is now admitted to be better than furs for extreme cold, though some travelers cling to fur garments. In the Arctic the furs do not suffer from the direct effects of cold, but from its indirect effects in the formation of frost and damp winds, the coming also to congelation of the exhalations from the body. It is for this reason that wool possesses superiority to skins as the former permits the moisture to pass through the fabric, the frost freezing outside, while furs retain it within. Upon the sledge journey, in temperatures ranging from 11 to 43 below zero, the winter wore no furs, save a pair of reindeer skin





the flow southward toward the equator, while the other ranges against the coast of Norway, keeping ice-free all winter the Arctic and northern half of Russia, to country even further north than the latitude of Point Barrow in Alaska, and then flowing on into the Barents sea against the western coast of Nova Zembla and, thus turned north westward, continuing its course to a westerly direction along the southern coasts of Franz Josef land. There our investigations and observations seemed as carefully to trace the mingling of the two currents. Just as the Gulf Stream is the product of one piling up of masses of water with in the Gulf of Mexico by the trade winds of the southern hemisphere, so the Arctic current which brings the icy waters down into the Atlantic from the polar sea is the product of the northern trade winds. We were thus at a most advantageous point for study of this vast circulatory system of the sea. We were at the meeting of the waters from the two Poles of our earth.

Of great importance to explorers is this constant movement of the light masses which arrange upon Arctic lands. It frees the coast of Franz Josef land of ice through the summer months, making navigable along its shores comparatively easy at that season, even though there may be a thick belt of almost impenetrable pack ice farther to the south. It brings to Arctic shores, too, from the headwaters of Siberian rivers, masses of driftwood for fuel and building purposes. It seemed to us a remarkable sign of course of nature, and we should find timber from the interior of Asia to, get it to our little hut and to burn with bladders for our fires and to board the sea above the tree-trunk and within a few hundred miles of the North Pole itself.

When we were going up the Terek off we found considerable quantities of timber and at times what might be not such a bad country, after all. Perfectly fresh water from a spring down from the glaciers in the mountain on the island formed a pure pool at the very shore. In doing our work we sawed out of frozen snowdrifts, coals as fine and white as from a mine. There was but a constant habit of walking into our foot-ways to be shot, and right by the stocks and stove we contrived to make of them a fine seat drew firewood upon the ocean right to the door of our dwelling, and never at any time did we have need of the sleds.

The summer was long but not too long. Best of all, gained for us by a good winter. It was not Arctic.

portion of parties should be of but ordinary ability. It was pleasant to record that though we were American and Norwegian as well as in one little room night and day for five months, not a word of discord between Yankees and Norsemen marred the novel experience. No better or more faithful men ever served under the banner of Norway than these young men who lived with me under the Stars and Stripes at Cape Tegethoff that winter, in the most northern inhabited place in the world, and who subsequently accompanied me upon the sledge journey.



It was on February 15 that we set out upon this trip to the north. The sun had not risen yet, the days were short and dark. But we knew that if we were to make the trip up, rough country as it was, of our predecessors we should have to start very early in the Arctic morning. We started out at 10 o'clock, wading through deep snows and rough ice, encountering extraordinary difficulties, sometimes making it for three miles a day and at last arrived at our outpost at Fort McKimby near the end of February. Here we found the tracks of a reindeer and of the muskox, what to trap for, we

to the history of Arctic exploration—had occurred during the winter. Bentzen had been taken ill in November, shortly after our men had left the two there together, and had never recovered. Languishing till January 2, carefully nursed by Egeberg, he at last had then come as Bentzen's relief. All this Egeberg told me, when, at the head of our little procession, I stood on standing in front of the tunnel which led down into the snow-covered burial hut. Then we entered in and Egeberg poked up the blubber fire and started to make me some coffee, as I sat looking about at the strange little cave, its walls coated with bear-frost even within two feet of the brilliant flames.

"Where did you bury Bentzen, Paul?" I asked.

"I have not buried him yet" was the reply. "He lies in

a little bag—a bagyole he says; it had been here in Washington—and we went into the darkened portion of the hut, partly partitioned from the remainder of the apartment, to which Paul had pointed. As soon as my eyes had become accustomed to the peculiar light which the frosted walls and roof reflected from the dim lamp, I saw at my feet a one-man sleeping bag, bearing evidence that it had been occupied by a living man the night before. By its side, within arm's reach, lay another bag. This one was occupied, as it had been for several months. Bag and contents were now frozen as solid as a rock. For two months Egeberg had slept by the body of his dead companion—the man, his eyes wide open in the Arctic darkness whose night was not to be distinguished from day—two months since with the sun in this Arctic latitude.

Egeberg had not buried Bentzen because he had promised to do so, and he had promised because of the sick man's wish that if buried in the cold and darkness it would be in such a manner that the bears and foxes might get at his remains.

Now that nothing was dreadful or out of the way which he had feared, Egeberg was an old, cheerful, and contented man. He was a little nervous, and had difficulty in getting to sleep, but next day he rolled us snug and cozy and carefully covered us in a hole which the wind had blown out for us. It was a hard day—45 below zero and a fierce blast blowing down from the glaciers. If it be the most industrious man of us all, after the little German ceremony was over, was Paul. For now he was busy checking up all the openings in the walls around the entrance. "I promised him the bears and foxes should not get him," he explained

We took Bymering was as contrary to our original plan, but soon set our journey to the north. Although the weather was still gloomy, the snow deep, in places, storms too frequent, the ice rough, and the loads heavy we made satisfactory progress. By March 20 we were off the east coast of Lydo Island, near the 82d parallel of latitude. Our prospects were bright. We had traversed one-fifth of the way to the pole, and had yet at our command for another advance six or seven weeks of the most favorable season. We had passed through the worst of the darkness and cold and had just reached that period when, in these latitudes, we were to have the sun at the time in the heavens. All our men and equipment were in good condition, and we were waiting the victory that lay before us when a seemingly trivial accident occurred to one of our number. A little pride with led to a fall, and this man, glorying in his strength and endurance, got past winter work, or his sledge through heavy ice when his team of dogs and fell in a little crevice in the path. The hurt which he received would not have been serious had he stopped for ten days or a fortnight for rest; but at that work, with the farthest north, and, perhaps even the close sleds, he coming from the ice does not stop. He always comes back, he had not the next day and got to work the day after. So he keeps going, dragging his useless sled, till he drops in the snow and can go no farther.

Then came the fatal retreat. The man could not hold his up and enough to be strong, by his faithful companions and his dogs. He suffered, of course, but quite as much in his pride as in his body for it is and wounds to be lashed off the feet of his sled. His Norwegian companions were as brave as lions and as tender as women. They nursed him and cared for him as a man full of tenderness. They made the arrangements to send him over the ice to the hospital, and they covered the sled with fresh water to temperatures of 40° below zero. Fearing the broken tender might be a month or longer, they made a gun and made for a man's life back to their partners at Cape Forgette, arriving there April 2.

If a man going southward upon the ice in the first days of April found himself going to the eastward, where the path of ice-capped mountains was seen, and the rays of the sun and a wind that in a couple of weeks he would take his sturdy Norwegians out to the ice.







1, that was yet another evidence that in Arctic exploration it is a good thing to have plenty of optimism, served in daily rations and carried in imperishable packages.

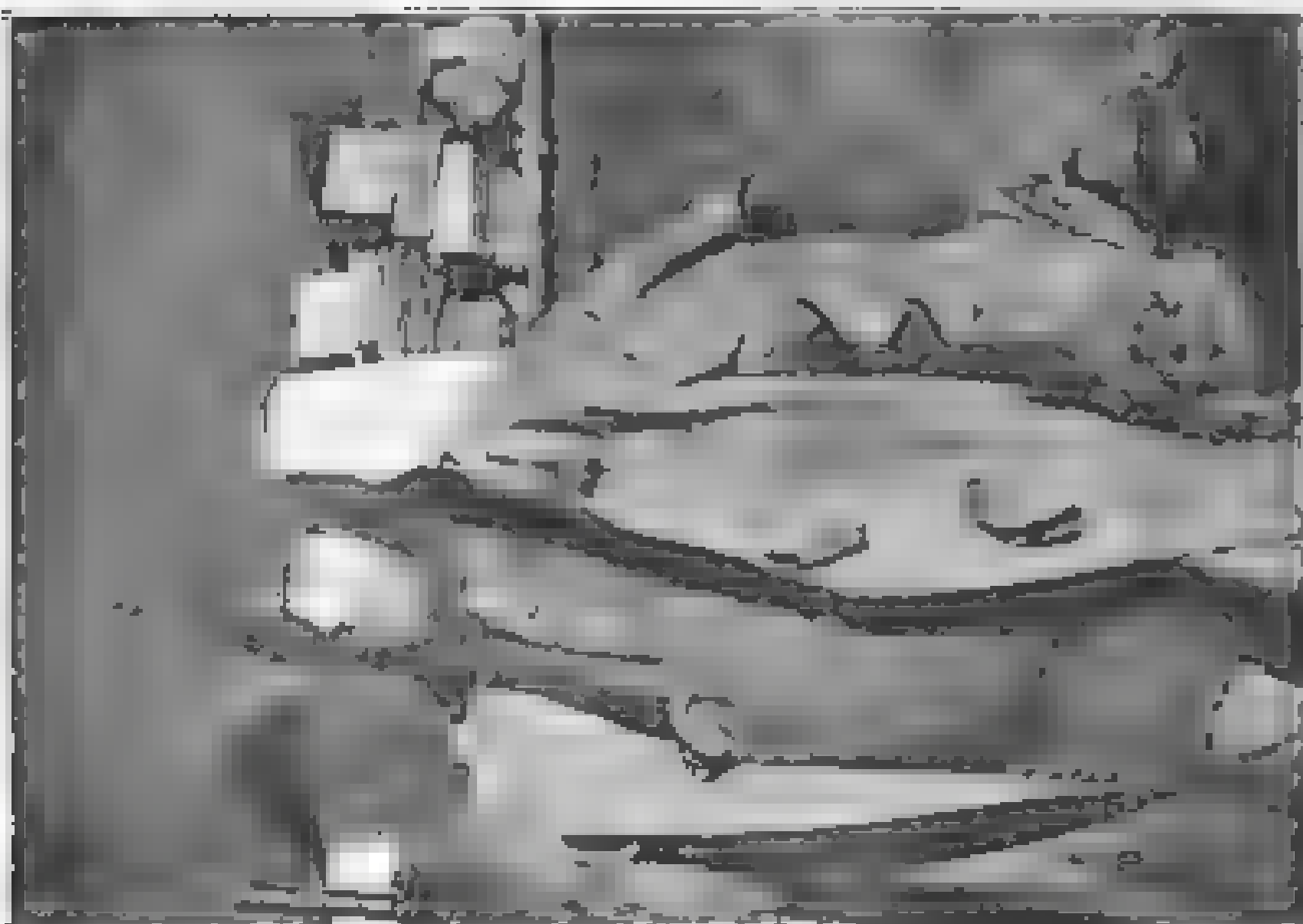
This journey was subsequently made, however, by a party led by Meteorologist Salomon, and the result of it was that, whereas when the William exploration arrived in Franz Josef Land the eastern coasts of that land were unknown and formed a topic of discussion among geographers, they are now carefully marked out upon the map. By means of these two arduous journeys and a voyage in the much-loved parts of Markham's sea, a survey has been made in the steamer *Isyvelva*, which was sent after the expedition at the expense of city traders, Arthur Wald and some 20 new lands or islands were added to the map of East Arctic seas. Upon these new lands, their capes and straits, we had the pleasure of putting the names of well-known American scientific and public men who had befriended the expedition, including that of the President of the National Geographic Society.

We bear testimony to the surprising accuracy of the survey of a part of Franz Josef Land which had been made by Payer, the discoverer of that region, 15 years before. His one great error, the location of an enormous glacier capping a land of ice a certain distance out, extending northward from Markham Land into the sea, a part demonstrated by Dr. Nansen, who had landed at the frozen islands and crossed on a journey over the sea to the spot where Payer had placed his hydrographer. We could barely find the description of that large glacier. The Danegardner had it exist for six weeks and the duration of his mission ascribed to him by the Austro-Hungarian explorer.

For a time, however, the path of Dr. Nansen—twice on our sledges, once by the far north, where we saw, but did not reach, three islands which he had passed without seeing as they lay under a middle ridge to the westward, of the course which we ran our sleds across the frozen channel and along the coast of North Markham and out of it. We regret, of course, the accident which deprived us of our chance to wrest from the giant Norwegian the honor of the farthest north, but if we have a more extensive knowledge to contribute to the world's knowledge of the north, we feel a fully repaid for our landings upon the sacrifices.

As yet, we are going to set sail to East Markham and spend what knows no number of summer months of knowledge. We









## THE HARRIMAN ALASKA EXPEDITION

by HENRY GANNETT

*Chief Geographer, U. S. Geological Survey*

The expedition notices of whose movements have appeared in earlier numbers of THE NATIONAL GEOGRAPHIC MAGAZINE reached Seattle on its return July 31. It left the same port for the same land, and in the intervening 60 days the *Albatross*, before leaving the expedition, sketched 5,000 miles and visited points along the entire northwest coast from Seattle to Wrangell. Not less than 300 shore landings were made. The *Albatross* returns collected in a general way on the accompanying sketch map of Alaska.

The party was composed of Mr. Harriman and a few assistants, a few men, with some of whom for their knowledge of the country of 10,000 were impressed as best as both state geologist and geographers, every possible fact for the prosecution.

As soon as the work was under way, outfitting for inland travel, and numerous places for the preparation of specimens, etc. Indeed, the whole expedition, although projected primarily as a pleasure trip for Mr. Harriman's family, was so directed in all ways to the needs of the scientific party. Even the movements of the ship were arranged day by day by a committee of board in the interest of the scientific work.

The general plan projected was to follow the coast, making brief stops at numerous points for the purpose of making observations and collections. The steamer followed the inside passages as far as possible, making numerous stops on the way but not of much duration until each day was reached. At this point, when it was possible for the numerous crews who by rank the vessel and arrange gatherings, the ship remained for several days, which were improved by the geologists in mapping the coast, paying special attention to the physical features of the coast for purposes of comparison with earlier measurements and for comparison by future students. A month's stop was made in Yakutat Bay, where the steamer was taken not only to the head of Yakutat Bay proper, but traversed its extension to its head. From Yakutat Bay the expedition went to Prince of Wales Sound and spent a week in taking first of all a most thorough region.



cause these glaciers extend so far downward as to protrude their fronts into the deep water of the fjords.

A few (10,000) years ago, perhaps at the time the Fyrdan fjords were the old low-lying land from which the passages now traversed by the fjords were filled with great rivers of ice from the sea out, or nearly to the mountain summits. Then the ice was spread in great sheets, over up and down the highest mountain ranges. The retreat of the ice, though apparent, as snow has yet been at so rapid a rate that the oldest land which first emerged, has suffered little from its retreat, a few years ago. The glacial current is still strong, as is evident, and it is in a region of excessive rainfall and at a place where the ice is so soft as to be a maximum. From the ice of the regions, generally forested, with the remains of an old forest of evergreen, we only pass going up the forested land and on the way to the top. As we approach the glacier, the forested land disappears. There is now but a single generation of trees, and these become younger and smaller. Soon they are covered by alder and willow, covered by grasses and annual plants, by mosses, and other low forms of vegetation, and, finally, by bare rock ridges, polished and smoothed by ice and by bare ground gravel a few inches only from the ice front.

The glaciers are still retreating. The next generation will find that of them with ice front as still as the sea, and a single step. The border of the glacier, as it comes off to the sea, will be no more related to the land. A century ago, when Melchior explored these glaciers, the ice extended much farther down the fjords than now. They found birds of prey which now are gone, and there is no doubt that the ice has the extent of far less deeply into the land. As we approached the Yakutat, we passed the ice front, and for the moment believed that to him it had been even to discover the long-expected narrow passage, but it was soon confronted by a high wall of ice, which, extending from the ice front, barred further passage. Suddenly an old man, a part of the Yakutat, said that he had been out here for a century was over. As we were passing, the front of the old glacier was retreated and a part of the ice has far away. The end of the old glacier, as the sea, was a extension of the old glacier has been turned, a house of ice, a house who first appeared. When this form was at its end, by the retreat of the old glacier. Because a lake, with its level some 200 feet above sea level, shown by lake benches along the walls. It is on it over the

to the south, directly to the Pacific, or westward to the lower part of Yakutat bay. Here, therefore, is a flood 25 miles in length, opened up within a century.

Port Wells, in Prince William sound (see map, page 511), is a fine example of the retreat of the ice and the opening of new passage ways. The old charts show this flood to be only some 30 miles in length, whereas the explorations of the Harriman expedition in 1899 show that it now runs northward into the strait not less than 40 miles. It terminates at the upper end in two branches, each occupied by a great glacier, Yale and Harvard, whose fronts are 100 miles apart. The water, while along the west side of the flood are four smaller glaciers, turning down in ice cascades from "hanging valleys" into the water. These terminal glaciers have retreated 3 miles in a century.

But the finest of the recent accessions to the navigable floods of Alaska is the Harriman flood, discovered and mapped by the expedition. This is a western branch of Port Wells and is not indicated on any chart. Five miles above its mouth it turns abruptly from a northwesterly to a southeasterly direction and runs for its course some 10 miles. At the head it is nearly closed by the retreat of Washington glacier. Indeed, although this glacier has been known for some time to the people who navigate these waters, it was supposed that it extended entirely across the flood closing it. It was therefore a great surprise, even to the local pilot of the *Kider*, when a close approach to the foot of Washington glacier disclosed a passage through an open flood, lined with magnificent glaciers and mountain peaks beyond.

Under the circumstances it required great nerve to take a 170-ton steamer through waters so utterly unknown as these. There was no danger from shoals in the open flood, but a projecting rock which may at an earlier date have been a headland might have been encountered at any moment, but the passage was safely to the head of the flood, with along at every point a wonderful scene of rock and ice.

From all these things it is certain that within the century the four great glaciers which now drop bays into the waters of Harriman flood were united in one, which occupied the flood from its present head to its mouth. Moreover, but few years have elapsed since the Washington glacier bridged or dammed the flood at its head, closing it to all access except by land journey. From these, and a number of similar instances which might be cited, it is clear that Alaska is "Our Youngest Possession." The coast, at

PRINCE WILLIAMS SOUND, ALASKA

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least, as to a recently emerged sea floor (as has been urged) as yet to be ascertained. But there are at present no signs as yet of a turned ice which covers as thousands of feet in thickness. The Mackenzie river covers an area probably as large as the state of Rhode Island and there are scores of other great rivers flowing into the bay. The region north of Prince William Sound is covered in greater part by glaciers. There is no doubt that a dry land route across the coast is a desideratum, long ago pointed out by Mr John Muir but persistently overlooked by geologists, is forced upon the attention of the traveler on the Alaskan coast. There is doubt the extension of glacial fronts is now the case of a considerable part of the coast. The Alaskan fronts were cut and are being cut today by glaciers below sea level. It may be that the coast is so being cut in a kind of character of an irregular line. The rivers are now protruding their fronts into water a hundred fathoms deep and many miles from where the shore line would be were the ice removed.

If the results are completed by this expedition little can be said at present, since little will be known until the specialists of the expedition have had time and opportunity to investigate the material collected. The universities of the party were arranged to suit were as to be especially favorable to the work of the biologists. The biologists made in many different localities afforded them an opportunity for a thorough study of the distribution of plant and animal life throughout a vast stretch of the coast. The comparatively larger specimens of the vegetation of the coast and the glacial regions enabled them to make quite extensive studies of the extension of plant and animal life over the region and to find from the sea covering and the land branch of study and as well be able to present a complete picture of results which will be of value.

## THE METEOROLOGICAL OBSERVATIONS OF THE SECOND WELLMAN EXPEDITION

By FANNY B. FAY, M. A.

*U. S. Summer School*

In the following article I propose to give in very brief outline of the general character of the meteorological work of the second Wellman Expedition and of the observations that were secured,















and that the same was warranted by the regular labors of the Federal States. How far the use of Latin forms in so important a connection, whether by accident or by design, has affected the usage of the language here, I am unable to say, but I am sensible of its influence. The *Florida* has the honor of using it, but not so, I believe, as it ought to do generally. Mr. Hall says, I have no advice to give. I have given up the idea of a grammar. He cannot run headlong to every new fangled language, where the rules are used in so few. I have not, however, done the thing at all. However, the forms *Florida* uses, and the Mr. Hall is to be absolute as to the one used, says that it is the last open view through the eye of America has taken upon itself to propose. I was a little surprised at a letter from Mr. Hall, who has concluded, from his former acquaintance, that Mr. Hall is a little Mr. Hall is to be consulted. I have not yet come to a conclusion. The only one who has taken notice of the use of the form is the Hon. Mr. Deane, of Louisiana, who is so nearly a recent person, that I have not yet had a chance to see him. It is a general case, however, in the first edition of the Department, the Hon. Mr. Deane, but the rest of them is not a copy to be taken. He has been the author of it, very much I am a little, as it is, and it is the case of the West. But we can have a person of great significance, and a great deal of consequence with, for the time being, of the West. He is a little person.

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## PLA NAMES IN CANADA

The first permanent set of the Geographic Board of Canada, published in 1894, included, by order of importance, as follows: (1) The set of maps of the Dominion, based on the Geographic Board's highest and latest authorities in 1892, and dated Jan. 1 of the following year. (2) The new geographical nomenclature of the Dominion as a whole, to be used as a guide for placing the new names upon a list of some 10,000







## GEOGRAPHIC LITERATURE

*Practical Hints for the Collection and Preservation.* By WILLIAM DUNNELL, M.D., Assistant in the French Language in the University of the City of New York. New York: Holt, Rinehart & Co., 1893. 32 pp.

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*Journal of International Development* A critical review of development processes, policy, and institutions of the international system. Published quarterly. Volume 15, Number 1, 2000. ISSN 0950-0804. Editor: David P. Collier. New York and London: 1999.

This book, written by a journalist that led a study of foreign press, plans to present a picture of the press of 15 countries, old and new, and popular and unimportant, as seen by the journalist in the past of the



one of the most important "territories" of the South Sea, through its fertile soil, its people, its products, presented in so convincing a way that it reads like a novel, and is perfectly estimated with the highest of modern work. Considered simply as a piece of book-making, it is, in paper, print, and illustration, one of the finest specimens that the country has brought forth. (p. 1)

*Hawaii and Its People. The Land of Rainbow and Aloha. By A. S. Fernald. Boston: Silver Burdett & Ginn Company. 1902.*

This book, an historical reader for young people, is a very readable account of the Hawaiian people, their legends, beliefs, and superstitions. It is divided into three parts, which deal, first, with the mythical folk-lore of ancient Hawaii; second, with the written records, beginning with Captain Cook's discovery of it; and, third, with modern Hawaii. It is also a volume, one of the descriptive and explanatory geography of the country, and the book has a number of good and attractive illustrations. It is one of a series of supplementary readers published by the same firm, of which are *Hudson's and the Indians of the Sagadahoc River*, *London's Argonauts*, (p. 1, L. 16.)

*The Islands, People, and the Education. By William H. W. Lewis and Samuel W. Lewis. London, pp. xix + 230, with 137 illustrations. London and New York: John Wiley & Sons.*

This book is an interesting narrative, set out in the form of a journal, of the trip made by the American Bureau of Medical and Engineering to the San Francisco convention. (p. 1, Spring of 1902.)

## GEOGRAPHIC MISCELLANEA

Vessels drawing 25 feet of water can now enter the veston harbor, and the foreign commerce of the port is rapidly increasing.

Work on the proposed tunnel is being prosecuted with great energy, but its completion is not looked for before the summer of 1904.

Professor Wilhelm Doerr, who died some time ago during an expedition among the North Sea islands, is reported to have left \$75,000 to the Ethnological Museum in Berlin. The interest of the bequest is to be used for purchasing new collections as the scientific requirements expand.

Dr F. A. Cook, surgeon and ethnologist of the Belgian Antarctic expedition, in an article contributed to *McClure's Magazine* for November, entitled "Two Thousand Miles in the Antarctic Ice," gives an interesting account of the experiences of the party during their winter in the South Polar regions.

The Great Swamp marsh was officially opened to traffic on October 24. The new waterway, which is 22 miles long, connects Chesapeake Bay with Atlantic sound and will be lighted and kept open by the much-dreaded Delaware canal. It is supposed to be a great improvement in the way of opening up to commerce a large number of acres of fertile land and a considerable amount of good hardwood and pine timber.

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† 1997-1998, 1999-2000, 2001-2002, 2003-2004, 2005-2006, 2007-2008, 2009-2010, 2011-2012, 2013-2014, 2015-2016, 2017-2018, 2019-2020, 2021-2022, 2023-2024, 2025-2026, 2027-2028, 2029-2030, 2031-2032, 2033-2034, 2035-2036, 2037-2038, 2039-2040, 2041-2042, 2043-2044, 2045-2046, 2047-2048, 2049-2050, 2051-2052, 2053-2054, 2055-2056, 2057-2058, 2059-2060, 2061-2062, 2063-2064, 2065-2066, 2067-2068, 2069-2070, 2071-2072, 2073-2074, 2075-2076, 2077-2078, 2079-2080, 2081-2082, 2083-2084, 2085-2086, 2087-2088, 2089-2090, 2091-2092, 2093-2094, 2095-2096, 2097-2098, 2099-2100, 2101-2102, 2103-2104, 2105-2106, 2107-2108, 2109-2110, 2111-2112, 2113-2114, 2115-2116, 2117-2118, 2119-2120, 2121-2122, 2123-2124, 2125-2126, 2127-2128, 2129-2130, 2131-2132, 2133-2134, 2135-2136, 2137-2138, 2139-2140, 2141-2142, 2143-2144, 2145-2146, 2147-2148, 2149-2150, 2151-2152, 2153-2154, 2155-2156, 2157-2158, 2159-2160, 2161-2162, 2163-2164, 2165-2166, 2167-2168, 2169-2170, 2171-2172, 2173-2174, 2175-2176, 2177-2178, 2179-2180, 2181-2182, 2183-2184, 2185-2186, 2187-2188, 2189-2190, 2191-2192, 2193-2194, 2195-2196, 2197-2198, 2199-2200, 2201-2202, 2203-2204, 2205-2206, 2207-2208, 2209-2210, 2211-2212, 2213-2214, 2215-2216, 2217-2218, 2219-2220, 2221-2222, 2223-2224, 2225-2226, 2227-2228, 2229-2230, 2231-2232, 2233-2234, 2235-2236, 2237-2238, 2239-2240, 2241-2242, 2243-2244, 2245-2246, 2247-2248, 2249-2250, 2251-2252, 2253-2254, 2255-2256, 2257-2258, 2259-2260, 2261-2262, 2263-2264, 2265-2266, 2267-2268, 2269-2270, 2271-2272, 2273-2274, 2275-2276, 2277-2278, 2279-2280, 2281-2282, 2283-2284, 2285-2286, 2287-2288, 2289-2290, 2291-2292, 2293-2294, 2295-2296, 2297-2298, 2299-2300, 2301-2302, 2303-2304, 2305-2306, 2307-2308, 2309-2310, 2311-2312, 2313-2314, 2315-2316, 2317-2318, 2319-2320, 2321-2322, 2323-2324, 2325-2326, 2327-2328, 2329-2330, 2331-2332, 2333-2334, 2335-2336, 2337-2338, 2339-2340, 2341-2342, 2343-2344, 2345-2346, 2347-2348, 2349-2350, 2351-2352, 2353-2354, 2355-2356, 2357-2358, 2359-2360, 2361-2362, 2363-2364, 2365-2366, 2367-2368, 2369-2370, 2371-2372, 2373-2374, 2375-2376, 2377-2378, 2379-2380, 2381-2382, 2383-2384, 2385-2386, 2387-2388, 2389-2390, 2391-2392, 2393-2394, 2395-2396, 2397-2398, 2399-2400, 2401-2402, 2403-2404, 2405-2406, 2407-2408, 2409-2410, 2411-2412, 2413-2414, 2415-2416, 2417-2418, 2419-2420, 2421-2422, 2423-2424, 2425-2426, 2427-2428, 2429-2430, 2431-2432, 2433-2434, 2435-2436, 2437-2438, 2439-2440, 2441-2442, 2443-2444, 2445-2446, 2447-2448, 2449-2450, 2451-2452, 2453-2454, 2455-2456, 2457-2458, 2459-2460, 2461-2462, 2463-2464, 2465-2466, 2467-2468, 2469-2470, 2471-2472, 2473-2474, 2475-2476, 2477-2478, 2479-2480, 2481-2482, 2483-2484, 2485-2486, 2487-2488, 2489-2490, 2491-2492, 2493-2494, 2495-2496, 2497-2498, 2499-2500, 2501-2502, 2503-2504, 2505-2506, 2507-2508, 2509-2510, 2511-2512, 2513-2514, 2515-2516, 2517-2518, 2519-2520, 2521-2522, 2523-2524, 2525-2526, 2527-2528, 2529-2530, 2531-2532, 2533-2534, 2535-2536, 2537-2538, 2539-2540, 2541-2542, 2543-2544, 2545-2546, 2547-2548, 2549-2550, 2551-2552, 2553-2554, 2555-2556, 2557-2558, 2559-2560, 2561-2562, 2563-2564, 2565-2566, 2567-2568, 2569-2570, 2571-2572, 2573-2574, 2575-2576, 2577-2578, 2579-2580, 2581-2582, 2583-2584, 2585-2586, 2587-2588, 2589-2590, 2591-2592, 2593-2594, 2595-2596, 2597-2598, 2599-2600, 2601-2602, 2603-2604, 2605-2606, 2607-2608, 2609-2610, 2611-2612, 2613-2614, 2615-2616, 2617-2618, 2619-2620, 2621-2622, 2623-2624, 2625-2626, 2627-2628, 2629-2630, 2631-2632, 2633-2634, 2635-2636, 2637-2638, 2639-2640, 2641-2642, 2643-2644, 2645-2646, 2647-2648, 2649-2650, 2651-2652, 2653-2654, 2655-2656, 2657-2658, 2659-2660, 2661-2662, 2663-2664, 2665-2666, 2667-2668, 2669-2670, 2671-2672, 2673-2674, 2675-2676, 2677-2678, 2679-2680, 2681-2682, 2683-2684, 2685-2686, 2687-2688, 2689-2690, 2691-2692, 2693-2694, 2695-2696, 2697-2698, 2699-2700, 2701-2702, 2703-2704, 2705-2706, 2707-2708, 2709-2710, 2711-2712, 2713-2714, 2715-2716, 2717-2718, 2719-2720, 2721-2722, 2723-2724, 2725-2726, 2727-2728, 2729-2730, 2731-2732, 2733-2734, 2735-2736, 2737-2738, 2739-2740,

A soft and extensive carpet of poplar and larch was observed on the mountain side, and the woods of the mountain were a beautiful green landscape.

The above-mentioned double drainage system of a drainage under the highway is a practical design. It is not difficult to put it in effect at least during the construction period. It can be easily turned to a single drainage system in the future. The height of the drainage proper shall be 60-80 cm.

The specimens of *Leptothorax* from the New York collection were all sent as separate lots to the following institutions for deposit: New York Coll. Fishes, by Dr. H. B. Pratt; U.S. National Museum, by Dr. S. S. Hensley; and the University of California, by Dr. J. S. Snyder.

The maximum value of the function  $f$  is achieved at  $x = 1$  and  $y = 1$ , and is equal to 1.

[illegible][illegible]

The Time To pass for them passed by and he did not come, then he came very, one day, but a first time as a part of the second and he, he pre-

From day of the year at length more we  
 "feel" again, & don't not always. It is a first time for production  
 & work done in ever been our way of it, but for the long run.

It is the world now, yet in north shore of the Mersey for nearly eight hours. Clear, cold, water, open in two rows, all of us over 20 miles of windage. The longest dock, the London dock, covers a part of 20 acres. The present a graving dock is but not long and not a great one. The world.

The reports circulated in several western newspapers of firing the shot that led to the striking up of a tornado in the vicinity, Okla., by the discharge of a cannon, has resulted to attend in a "tornado wrecker" patented by W. S. Allen, of Okla., several years ago. The principle has been already tested upon a storm so that several persons engaged in the making of a up-reaching tornado with a cannon, although in the mind. The Chief of the Weather Bureau, at Albany, states, however, that the discharge of the most powerful cannon would be utterly unavailing in its effect upon a tornado cloud, and that it is impossible for such clouds to be dissipated by any explosion that can be devised.



Alaska, and that the United States Government, by the generous cession of a large territory to the population of Siberia with its 20,000,000 inhabitants, presents a model of the facilities that will be afforded by the Russian government for the exploitation of its enormous wealth in timber and minerals, as far as is possible. Mr. Vassiloff, however, does not look for an immense increase—sixty or eighty per cent—as is predicted.

Many Russian writers, while recognizing the rapidity of population of the Russian provinces, will still cling to the old fallacy even in the most advanced and most western European Russia, the density of population is far below that of other European countries.

Among the many interesting facts brought out by the geological and geodetic survey parties operating in Alaska are several relating to total population. The statistics in this respect were collected by Assistant Richter and by him the total census as registered on the gauges is of a peculiar type. For example, in the Yukon territory, where the river part is very nearly a straight line. A possible explanation of this phenomenon may be found in the large proportion of the total population below a certain level. The total width in western Alaska by Asiatic and Asiatic was a rapid transition from a narrow strip of small islands to a wide, continuous sea. During the last few years, the Yukon, the Yukon, and the Yukon.

During the year 1899 in the title of a recent report issued by C. P. Austin, Chief of the Bureau of Statistics of the Treasury Department. The report is a summary of the physical and cultural features of the various countries of the world, of different parts of British Africa, German Africa, Italian Africa, Argentina, the East Republic, and of every state of the continent. An excellent chart of Africa 14 by 18 inches accompanies the report. There are also diagrams showing the languages as well as the regions of the different sections of the continent. The report is an exceedingly valuable and interesting one and should be in the hands of every one interested in the economic progress of Africa.

At a meeting of the Board of Managers of the National Geographic Society, November 1, 1900, the following resolutions were passed:

Resolved, That the Board of Managers of the National Geographic Society having learned with profound regret of the death of the Hon.

and Prof. H. H. D. of the American Geographical Society

Resolved, That the Board of Managers of the National Geographic Society having learned with profound regret of the death of the Hon. and Prof. H. H. D. of the American Geographical Society

Resolved, That a copy of these resolutions, signed by the President and the Secretary, be transmitted to the American Geographical Society

One of the most interesting features of railroad travel in the mountain regions of the Far West has hitherto been the steep grades by which the various lines have, with one or two notable exceptions, been made to reach the high elevations at which they have been carried over the difficult courses. These, however, are rapidly being done away with as well as met by the construction of tunnels, or others by the building of new roads over passes of lower altitude. The famous Vail Pass line of the Denver and Rio Grande, with a maximum grade of 47 per cent, or






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הוא מנסה להבין את המציאות, וזהו תפקידו של המורה. המורה הוא מי שנותן את המענה, וזהו תפקידו של המורה. המורה הוא מי שנותן את המענה, וזהו תפקידו של המורה.

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המחברת מודה לפרופ' ד"ר חגית גורן על שיתוף הפעולה והעזרה במחקר, לפרופ' ד"ר חגית גורן על שיתוף הפעולה והעזרה במחקר, לפרופ' ד"ר חגית גורן על שיתוף הפעולה והעזרה במחקר.

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התאחדות המורים  
התאחדות המורים

·111· 11月12日 14日

**Feldman, J. [1978].**

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ՀԱՅԱՍՏԱՆԻ Ի ԱՐԽԻՎՈՒՄԻ Ա  
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ԿԱՐԴԻՆԱՆԻ ԳՐԱԴԱՐԱՆԻ

THE HON. MEMBER FOR  
WINDYBUSH: Mr. Speaker, will you please  
ask the Minister of Agriculture  
and Fisheries to be good enough to  
advise me as to the  
possibility of applying

1. The first of these is the fact that the number of cases of the disease is increasing. This is due to the fact that the number of cases of the disease is increasing.

2. The second of these is the fact that the number of cases of the disease is increasing.

3. The third of these is the fact that the number of cases of the disease is increasing.

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6. The fourth of these is the fact that the number of cases of the disease is increasing.

7. The fifth of these is the fact that the number of cases of the disease is increasing.

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9. The sixth of these is the fact that the number of cases of the disease is increasing.

10. The seventh of these is the fact that the number of cases of the disease is increasing.

11. The eighth of these is the fact that the number of cases of the disease is increasing.

12.

13. The ninth of these is the fact that the number of cases of the disease is increasing.

14.

15. The tenth of these is the fact that the number of cases of the disease is increasing.

16.

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19. The eleventh of these is the fact that the number of cases of the disease is increasing.

20. The twelfth of these is the fact that the number of cases of the disease is increasing.

21. The thirteenth of these is the fact that the number of cases of the disease is increasing.

22.

23. The fourteenth of these is the fact that the number of cases of the disease is increasing.



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## ERRATA

Page 40 Line 1, Eq. (30) For  $M_{\text{max}}$  read  $M_{\text{min}}$

Page 46 Eq. (31) For  $C_{\text{th}}$  read  $C_{\text{th}}$

Page 55. Eq. (1) For  $C_{\text{max}}$  read  $C_{\text{min}}$

Page 200. Eq. (9) For  $C_{\text{max}}$  read  $C_{\text{min}}$  For  $C_{\text{min}}$  read  $C_{\text{max}}$

Page 218 Line 38. Eq. (14) For  $C_{\text{max}}$  read  $C_{\text{min}}$  For  $C_{\text{min}}$  read  $C_{\text{max}}$

Page 23 Line 20. page 232. Eq. (15) For  $C_{\text{max}}$  read  $C_{\text{min}}$  For  $C_{\text{min}}$  read  $C_{\text{max}}$

Also that page 220, Eq. (16) For  $C_{\text{max}}$  read  $C_{\text{min}}$  For  $C_{\text{min}}$  read  $C_{\text{max}}$

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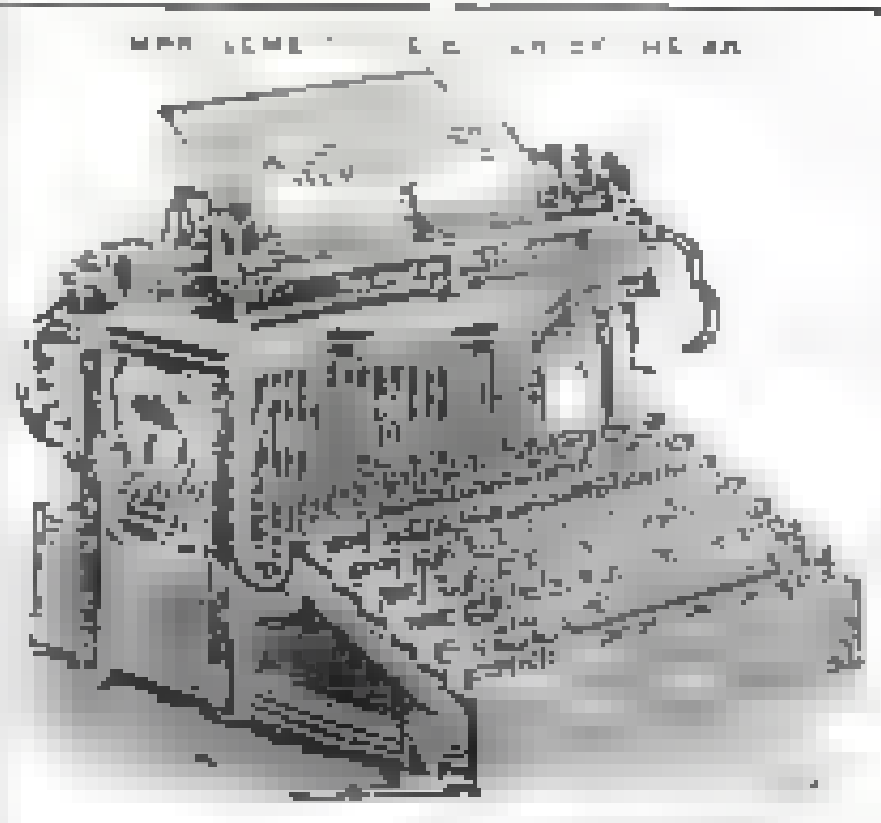
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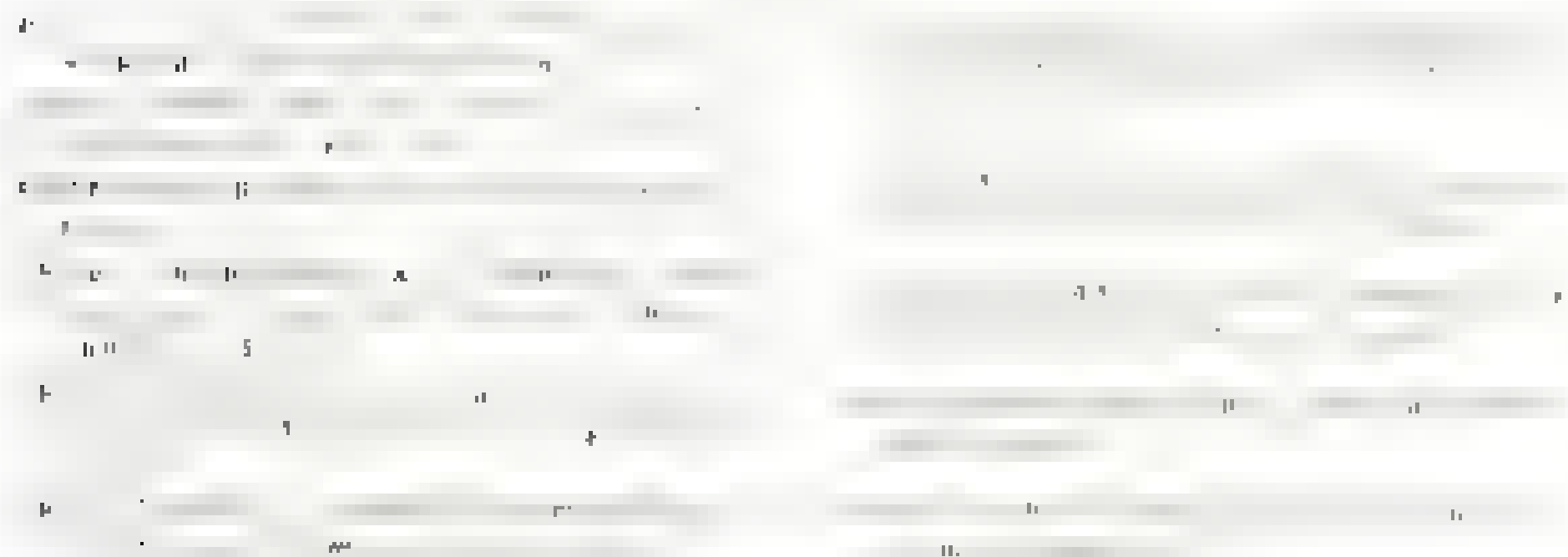
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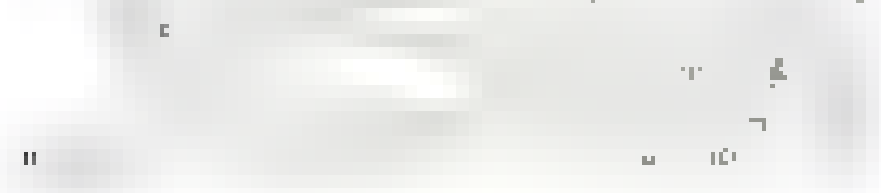
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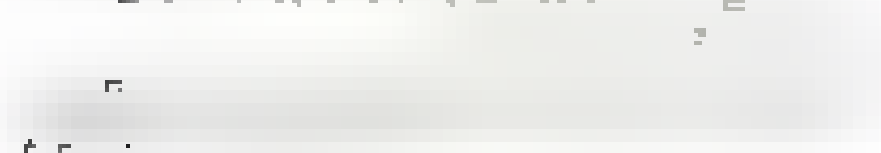
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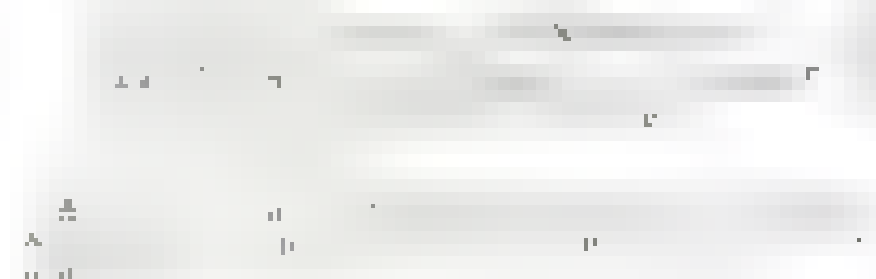
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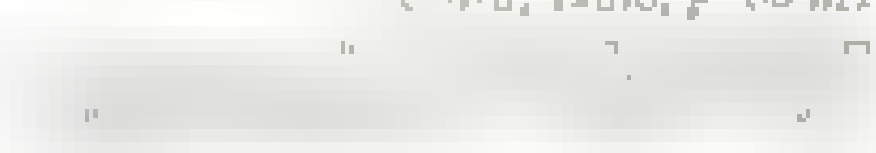
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